CONTAINER HAVING A CUT PANEL LID WITH A PULL FEATURE

FIELD OF THE INVENTION

[0001] The present invention relates generally to containers with removable lids. More particularly the invention relates to containers with a panel cut from the container body to form an opening that is subsequently sealed by reattaching the panel with a pull feature, such that the panel functions as a removable lid.

BACKGROUND OF THE INVENTION

[0002] Many consumable goods are packaged in containers with removable lids to provide safe and convenient storage of the consumable goods. Such consumable goods include may items used by consumers, particularly food products. Frequently, the type of removable lid required for the consumable good may limit the design of the container. In addition, the production processes required to properly store the consumable goods may also limit the design of the removable lid.

[0003] Metal ends are commonly used to seal openings of containers. Metal ends of standard sizes can be economically produced, can be seamed to containers very quickly, and can be removed by consumers quickly and easily. However, as the closure design becomes more unique and complex the cost of the metal ends increase. Furthermore, product spillage can contaminate the sealing surfaces and diminish the quality of the seal of the metal end.

[0004] Heat-sealed flexible membranes are also used to seal container openings. However, it is often the case that a heat seal strong enough to survive harsh conditions, such as retort sterilization processes, makes the membrane difficult for consumers to remove. Plastic closures with screw-on tops can be applied to containers relatively quickly but are limited in size to smaller diameter openings. Plastic to plastic seals (such as spin welding or heat staking) may also be used to sufficiently seal a container, but the sealed closure cannot be easily separated to open the container. Additional closures such as foil membranes, paper ends, or plastic ends are applied to containers at relatively slower speeds compared to metal ends or plastic screw-on tops, which reduces the efficiency of those packaging processes.

[0005] Therefore, a need exists for a container with a removable lid that withstands harsh manufacturing processes, provides sufficient sealing abilities, and affords convenient removal by the consumer. In addition, the manufacturing process for such a container and removable lid should be cost-effective, timely, and consistent.

BRIEF SUMMARY OF THE INVENTION

[0006] The invention addresses the above needs and achieves other advantages by providing a container comprising a container body formed by a wall with an opening defined in the wall. The opening in one embodiment is formed by cutting the wall to remove a panel from the wall. The panel is sized to substantially completely cover the opening. The panel is reattached to the container body to cover the opening and to create a sealed, frangible interface between the panel and the wall defining the opening. A pull feature is joined to the panel and, when pulled, causes detachment of the panel from the container body along the sealed, frangible interface. Removal of the panel provides access to the contents of the container through the opening.

[0007] The opening of the container may be in an end wall and the container may include a second opening on an end of the container opposite the end wall. A metal end may close the second opening. Alternatively, a foil membrane or a closure of the same material as the container may close the second opening. The pull feature joined to the panel may comprise a pull tab joined to the exterior surface of the panel or may comprise a pull tab connected to a ring or strip. If a pull tab is included, the panel may be reattached by heat staking. Alternatively, if a pull tab and ring are included, the pull tab may join the exterior surface of the panel and the ring may comprise a portion of the sealed, frangible interface. The ring may overhang the outer edge of the panel and engage the wall of the container proximate the opening to form the sealed, frangible interface. The ring may alternatively join the outer edge of the panel and engage the inner edge of the wall defining the opening to form the sealed, frangible interface. Adhesives may be used to facilitate the various sealed, frangible interfaces. Furthermore, a container may include any combination of closure for the second opening and pull feature for the panel.

[0008] Another embodiment of the present invention includes a container comprising a container body formed by a wall with an opening defined in the wall and a panel attached with a sealed, frangible interface between the panel and the wall defining the opening. The panel substantially completely covers the opening. A pull feature is joined to the panel and, when pulled, causes detachment of the panel from the container body along the sealed, frangible interface. Removal of the panel provides access to the contents of the container through the opening.

[0009] A further embodiment of the present invention includes a container comprising a thermoformed container body defining a top end of the container and a bottom end of the container. The top end includes an opening and the container body flares outwardly from the top end to the bottom end. A removable lid is attached to the top end of the container body to cover the opening.

[0010] A method for manufacturing a container is also provided. A wall defining the container body is formed and a panel is cut from the wall to define an opening. The panel is sized to substantially completely cover the opening. A pull feature is joined to the panel and the panel is reattached to the container body to cover the opening and create a sealed, frangible interface. The pull feature allows the panel to be detached from the container body along the sealed, frangible interface when the pull feature is pulled. The container body may be formed to include a second opening that may have various closures attached to the second opening. In addition, the pull feature may include alternative portions that allow for various sealed, frangible interfaces.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0011] Having thus described the invention in general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

FIG. 1 is a perspective view of a container in accordance with a first embodiment of the invention;

FIG. 2 is a perspective view of a container body as initially formed for making the container of FIG. 1;

FIG. 3 illustrates the container body having been cut to remove a panel from an end wall of the container body;

FIG. 4 shows a pull tab and ring having been affixed to the panel;

FIG. 5 shows the panel having been reattached to the container to close the opening;

FIG. 6 is a perspective view of the container illustrating the removal of the panel by a consumer;

FIG. 7 is a schematic, cross-sectional view of the container of FIG. 1, illustrating the ring of the pull feature located above the cut line, with a foil membrane enclosing the second opening, and with a product contained within the container body;

FIG. 8 is a schematic, cross-sectional view of a container, in accordance with a second embodiment of the invention, illustrating a container with a ring of the pull feature located within the cut line and with a double-seamed metal end enclosing the second opening;

FIG. 9 is a schematic, cross-sectional view of an embodiment of a container in accordance with a third embodiment of the invention, illustrating a container without a ring of the pull feature and with a heat staked polymer closure enclosing the second opening; and

FIG. 10 is a perspective view of the container of FIG. 9.

DETAILED DESCRIPTION OF THE INVENTION

[0012] The present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all embodiments of the invention are shown. Indeed, the invention may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like numbers refer to like elements throughout.

[0013] With reference to **FIGS. 1 – 6**, a container and process for making the container in accordance with various embodiments of the present invention are illustrated. The container comprises a container body **10** having a side wall **20** of generally tubular or conical form, at least one end **27** of which defines an opening **36** closed by a removable

lid comprising a panel **12** to which a pull feature is attached, as further described below. In the first embodiment shown in **FIG. 1**, the container body **10** also has a membrane **40** that is attached to an opposite end **28** of a side wall **20** and is not intended to be removed; as an alternative to the membrane closure **40**, this closure could instead be a metal end or a plastic end. The finished container of **FIG. 1** provides a sealed storage container for a product that is accessible by removing the panel **12**. The pull feature of panel **12** illustrated in **FIG. 1** comprises a pull tab **30** and a ring **32** to facilitate the removal of the panel from the container body **10**.

[0014] The container is made by first forming the container body **10** as shown in **FIG. 2**. The container of **FIG. 2** initially has an end wall **22** at the end **27** of the side wall **20**. The end wall **22** is generally perpendicular to the axis about which the side wall **20** extends. The side wall **20** extends from the end **27** and terminates at an opposite end **28**. The opposite end **28** of the container body **10** of **FIG. 2** is open and defines a second opening **38**.

[0015] The container body **10** is formed as a single integral piece, such as by injection molding, blow molding, or thermoforming a suitable polymer material. Alternative container bodies may include various materials, but are preferably plastic materials, and may be formed by various processes, such as thermoforming and blow molding to list two non-limiting examples.

[0016] The end wall **22** of the embodiment shown in **FIG. 2** is a generally planar panel of constant thickness that includes a peripheral portion **26**. End walls of alternative container bodies may be of any shape or any size relative to the side wall **20**; as an example, the end wall can be shaped to be non-planar so as to allow for distortion or expansion at high temperatures. The end **27** of side wall **20** joins the peripheral portion **26** of the end wall **22**, and the side wall extends away from the end wall until terminating at the opposite end **28**. The side wall **20** of **FIG. 2** includes an outward frustoconical flare from the end wall **22** to the opposite end **28** and includes an opposite end with a cross sectional thickness greater than the end **27** of the side wall. The additional thickness provides structural support for the container because the opposite end **28** preferably functions as the bottom of the finished container body **10**. Alternative container bodies may be of any shape or size and the side wall **22** may extend away from

the end wall **20** at any angle relative to the end wall and the angle may also change as the side wall extends further from the end wall. The thickness of side wall **22** may be constant from the end **27** to the opposite end **28** or may change along any portion of the side wall **22**.

[0017] Once the container body **10** has been made, the wall of the container body is cut to remove a panel **12** and to define an opening **36** in the container body. The cutting may be accomplished in various ways, including but not limited to cutting with a knife, a laser, an ultrasonic device, or the like. The panel **12** of **FIG. 3** is cut out along a cut line spaced radially inward from the outer periphery of the end wall **22** such that a peripheral portion **26** remains joined to the side wall **20**, and projects radially inwardly therefrom. Alternative container bodies may remove the panel **12** from any portion of the container body, such as the side wall **20**, to list a non-limiting example, or may remove the entire end wall such that no peripheral portion **26** remains joined to the side wall **20**. The resulting panel **12** defines an outer edge **14** of the panel. The opening **36** defines an inner edge **24** of the end wall **22** that encircles the opening.

[0018] As seen in **FIG. 7**, the cut line is made at a 45 degree angle and tapers inward as it progresses toward the interior of the end wall **22** such that the panel **12** may be removed from the exterior of the container body **10**. Alternatively, the cut angle may range between 0 and 90 degrees if the panel **12** is to be removed from the exterior of the container body **10** or may range between 90 and 180 degrees if the panel is to be removed toward the interior of the container body. A 90 degree cut allows the panel **12** to be removed toward either the exterior or interior. Any cutting or perforating method may be utilized to separate the panel **12** from the wall of the container body **10**. Preferably little or no material is removed from the container body **10** and panel **12** during the cutting process so that the panel **12** substantially completely covers or fills the opening **36**, such that the outer edge **14** of the panel is closely adjacent the inner edge **24** of the container body **10**.

[0019] A pull feature, such as the combined pull tab **30** and ring **32** of **FIG. 4**, may be added to the panel **12**. The pull feature facilitates removal of the panel **12** from the container body **10** after the panel has been reattached to the container body **10**. The pull feature provides a surface that can be gripped to pull the panel **12** away from the

container body **10**. Alternatively the pull feature may comprise only a pull tab **30** or may comprise a protrusion on the exterior surface **18** of the panel **12** formed when the container body **10** was formed. The protrusion may provide a convenient surface for an individual to pull the panel **12** from the container body **10**. If the pull feature is joined to the panel **12** during a process subsequent to the forming of the container body **10**, the joining process may include conductive heat sealing, ultrasonic sealing, heat staking, the applying of adhesives, or any other joining method.

[0020] The pull feature of **FIG. 4** is a single component consisting of a pull tab **30** and a ring **32**, wherein the pull tab is connected to the ring and the ring is joined to the exterior surface **18** of the panel **12**. The ring **32** of **FIG. 4** is joined along the perimeter of the panel **12** and overhangs the outer edge **14** of the panel **12**. This configuration provides an overhanging portion of the ring **32** that may subsequently be used to form a sealed, frangible interface with a portion of the container body **10**. The ring **32** may alternatively be joined to the outer edge **14** of the panel **12**, or may be joined to any surface of the panel. Furthermore, the ring may completely encircle the panel **12**, or the ring may only partially encircle the panel, such as with a 90 degree arc or a 180 degree arc, to list two non-limiting examples.

[0021] The pull feature of **FIG. 4** is joined to the panel **12** after the panel has been cut from the container body **10** and before the panel is reattached to the container body. Alternatively, the panels may include a pull feature joined before or during the cutting of the panel or joined during or after the reattaching of the panel. The pull feature may be of any suitable material such as a polymer, elastomer, or elastomeric polymer, to list non-limiting examples. The pull feature preferably can withstand harsh manufacturing processes while maintaining the structural strength to facilitate subsequent removal of the panel **12** from the container body **10**.

[0022] **FIG. 5** shows the panel **12** reattached to the container body **10**, and **FIG. 6** shows the panel being removed from the container body. The panel **12** of **FIG. 5** is reattached with a sealed, frangible interface **34**, as illustrated in **FIG. 7**, created by the engagement of the overhanging portion of the ring **32** and the peripheral portion **26** of the container body **10**. The sealed, frangible interface **34** provides a hermetic seal that prevents the transmission of oxygen, moisture, contaminants, and other substances into or

out of the container. Furthermore, the sealed, frangible interface **34** provides a separation surface for the panel **12** from the container body **10** because the bond strength between the overhanging portion of the ring **32** and the peripheral portion **26** of the container body is not as strong as the bond strength between the ring and the panel. Therefore, pulling the pull tab **30** of the pull feature, as illustrated in **FIG. 6**, separates the panel **12** from the container body **10** along the sealed, frangible interface **34** rather than removing the pull feature from the panel. **FIG. 6** shows the panel **12** partially removed, and further pulling on the pull tab **30** may completely remove the panel from the container body **10**. The panel **12** may bend an amount less than, equal to, or greater than the bending of the panel shown in **FIG. 6**, as the amount of bending depends upon the thickness and material of the panel and the bond strength of the sealed, frangible interface **34**.

[0023] An alternative sealed, frangible interface **134** is shown in **FIG. 8**. The pull feature is joined to the panel such that the ring **132** is joined to the outer edge of the panel **12** with an interface **136** and the pull tab projects above the exterior surface **18** of the panel. The interface **136** does create a seal similar to the seal, frangible interface **134**, but is not frangible during the ordinary use of the container. The sealed, frangible interface **134** of **FIG. 8** is created between the surface of the ring **132** opposite the outer edge **14** of the panel **12** and the inner edge **24** of the peripheral portion **26** of the container body **10'**. Such engagement between the surface of the ring **132** and the inner edge **24** may include the addition of a bonding material or may involve a manufacturing process to create the sealed, frangible interface **134**.

[0024] The sealed, frangible interface, such as the interface **34** of **FIG. 7**, the interface **134** of **FIG. 8**, or the interfaces of other embodiments, may include an adhesive or other joining compositions. Non-limiting examples of materials that may be applied to create the sealed, frangible interface are epoxies and heat set adhesives. Alternatively, the sealed, frangible interface may be created by a manufacturing process without the application of additional materials. One non-limiting example is a heat staking process using conductive, inductive, or ultra sonic methods. Regardless of the method used to create the sealed, frangible interface, the bond strength of the sealed, frangible interface is less than the bond strength between the joined pull feature and panel. The sealed, frangible interface is preferably configured such that once the panel **12** has been

removed, the inner edge **24** of the peripheral portion **26** does not include any surface defects that might interfere with removal of the contents or that might inconvenience the consumer.

[0025] **FIG. 9** shows a panel **12** reattached to the container body **10''** by heat staking to form a sealed, frangible interface **334**. The pull feature of **FIG. 9** does not include a ring, such as a ring **32** of **FIG. 7**; therefore, the panel **12** is reattached directly to the peripheral portion **26** of the container body **10**. As shown in **FIG. 9**, the heat staking process essentially melts the material proximate the outer edge **14** of the panel **12** and the inner edge **24** of the peripheral portion **26** of the container body **10''** so that the panel is reattached to the container body. A non-limiting example of a heat staking process is the use of RF generation wherein the electrodes are positioned adjacent the outer edge **14** and inner edge **24** to create a radio frequency field, preferably in the range of 0.1 to 300MHz, that melts the material comprising the outer edge and inner edge, which is preferably a heatable polymer or thermoplastic, thus creating the sealed, frangible interface **334**; as known in the art, the RF process requires some type of electrically conductive material in the polymer. Alternative processes and materials may be used to create the sealed, frangible interface **334**. Thus the sealed, frangible interface **334** of **FIG. 9** reattaches the panel **12** and container body **10''** along the cut line preferably with a bond strength less than the internal bond strength of the end wall **22** prior to cutting or with a configuration to facilitate subsequent removal of the panel from the container body along the sealed, frangible interface **334**. A non-limiting example of a configuration to facilitate removal of the panel **12** is an interface that creates a stress concentration and to initiate and propagate the separation of the panel from the container body **10**. Regardless of the method of reattaching utilized or the configuration of the panel, pull feature, and sealed, frangible interface, the panel **12** is reattached to the container body **10''** to seal the container and to provide a convenient method of opening the container.

[0026] The panel **12** may alternatively be made separately from the container body **10**, such that the opening **36** of the container of **FIG. 4** was created during the forming of the container body. The container body **10** is formed with an opening **36** defining the inner edge **24** of the end wall and the panel **12** is sized to substantially completely cover the opening to create a sealed, frangible interface between the panel and container body when

the panel is attached to the container body. The separately made panel **12** may include a pull feature and/or may be attached by methods similar to those of the containers that include a panel cut from the container body **10**.

[0027] The container body **10** may also include a second opening **38**, as shown in **FIGS. 2 – 5**, defined by an opposite end **28** of the side wall **20**. This second opening **38** is preferably included to allow the insertion of the contained product into the container body. **FIG. 7** illustrates a product **50** contained within the container body **10** that is enclosed by a closure **40** attached to the opposite end **28** of the side wall **20**. The contained product **50** is preferably inserted into the container body **10** after the panel **12** has been cut and reattached, or simply attached, and the sealed, frangible interface **34** has been created. After the contained product **50** has been inserted into the container body **10**, a closure **40** is attached to the opposite end **28** of the side wall **20**. The closure **40** is not intended to be removed by a consumer; rather, the panel **12** with the pull feature is intended to be removed by a consumer to gain access to the contents through the opening **36**. Alternatively, other container bodies may not include a second opening **38** and closure, wherein the product **50** is inserted into the container body **10** prior to the reattachment of the panel **12**, or the container bodies may not insert the product through the second opening **38** though one is provided.

[0028] Many containers manufactured with thermoforming, blow molding, or similar forming processes necessarily include an opening because of the mechanical limitations of the manufacturing process. The second opening **38** defined by the opposite end **28** of the side wall **20** of the **FIG. 7** is an example of an opening created during forming. Often the opening created during forming is not the preferred opening for the consumer to gain access to the contents within the container. The present invention addresses this situation by cutting the panel **12** from the container and reattaching the panel to create an opening **36** for consumers to gain access to the product **50** while sealing the originally formed second opening **38** and preventing access to the product through the second opening. Alternatively, the container may be formed with multiple second openings or may be formed with no second opening. If a second opening is included in the container body, a closure may be attached to seal the product within the container.

[0029] Containers formed by thermoforming include an opening at the largest end of the container so that the container body can be removed from the thermoforming equipment. Because thermoforming equipment typically includes a single mold into which the raw material is formed, the formed item must not include any portions within the mold that are larger than the opening of the mold. Therefore, thermoformed items typically include an opening at the largest portion of the item. The present invention overcomes this constraint by providing a thermoformed container body **10** that defines a top of the container and a bottom end of the container. An opening **36** illustrated in **FIG. 4** is provided in the top end of the container body **10**, which coincides with the end wall **22**. The container body **10** flares outwardly from the top end to the bottom end. The opposite end **28** of side wall **20** functions as the bottom end of the container body **10**. By cutting the panel **12**, an opening **36** is provided on the top of the thermoformed container body. The panel **12** functions as a removable lid after it is reattached to the container body **10** to create the sealed, frangible interface. The opening formed while thermoforming the container body **10** is the second opening **38** that is subsequently covered by a closure.

[0030] The container body **10** of **FIG. 7** includes a closure that is a film membrane **40**. Preferably the film membrane **40** is a foil membrane with an upper polymer layer **44** and a lower foil layer **42** that provides convenient attachment to the opposite end **28** of the side wall **20** and that prevents the transmission of oxygen, moisture, and other substances through the membrane. After the product **50** has been inserted into the container body **10**, the membrane **40** is positioned over the second opening **38**, thus engaging the entire opposite end **28**, and is attached to the opposite end using adhesive materials or manufacturing processes to create a seal. The foil membrane **40** of **FIG. 7** is attached by conductively heating the upper polymer layer **44** along the opposite end **28** of the polymer container body **10** such that a bond is created. The foil membrane **40** thus defines the bottom of the container body **10** of **FIG. 7** and the panel **12** defines the top of the container

[0031] An alternative closure for the second opening **38** of container body **10'** is shown in **FIG. 8**. The closure of **FIG. 8** is a metal end **240** double seamed to the opposite end **228**. The opposite end **228** includes a flange **230** that encircles the opposite end and that

projects outward from the opposite end. The flange **230** of **FIG. 8** facilitates the attaching of the metal end **240** by a double seam process. U.S. Patent No. 5,971,259 to Bacon discloses a method of double seaming metal ends to containers, the disclosure of which is incorporated herein. The metal end **240** is positioned over the second opening **38** thus engaging the entire opposite end **28** and is rolled and tucked about the flange **230** to attach the metal end and to create a seal that prevents the transmission of oxygen, moisture, and other substances through the interface between the metal end and flange **230**. Compound materials may be included on the flange **230** or the portion of the metal end **240** engaging the flange to assist in the sealing of the metal end by filling any gaps created during the double seaming process.

[0032] Yet another alternative closure for the second opening **38** of container body **10''** is shown in **FIG. 9**. The closure of **FIG. 9** is a cover **440** of the same material as the container body **10''**. Therefore, if the container body **10''** is a polymer material, to name a non-limiting example, then the cover **440** is the same polymer material. Providing the same material cover allows the cover to be attached to the opposite end **428** by a heat staking process to create a sealed interface **446**. The heat staking process may be the same or similar heat staking process used to create the sealed, frangible interface **334** of **FIG. 9**. The material of the upper surface **444** of the cover is heated along with the material of the opposite end **428** such that the materials unite and when cooled create the sealed interface **446**. Similar to the closures of **FIG. 7** and **FIG. 8**, the cover **440** of **FIG. 9** defines the bottom surface of the container body **10''**. Alternative closures for second openings may be used for additional containers of the present invention. In addition, the various pull features and reattachment configurations for the panel **12** may be combined with the various closures and attachment configurations for the closures to define additional embodiments of the present invention.

[0033] A further embodiment of the container is illustrated in **FIG. 10**, wherein the pull feature is a pull tab **30** without a ring, such as the ring **32** shown in **FIG. 4**. The pull tab **30** of **FIG. 10** is attached to the exterior surface **18** of the panel **12**. The pull tab **30** may be joined to the panel **12** before cutting the panel, before reattaching the panel, or after reattaching the panel. The pull tab **30** of **FIG. 10** may also be joined to the panel **12** by any of the processes used to attach the pull feature of **FIGS. 1-6**.

[0034] Many modifications and other embodiments of the invention set forth herein will come to mind to one skilled in the art to which the invention pertains having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the invention is not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.